

Thomsen E. Functional significance of the neurosecretory brain cells and the corpus cardiacum in the female blow-fly, *Calliphora erythrocephala* Meig. *J. Exp. Biol.* 29:137-72, 1952.

[Zoological Laboratory, Royal Veterinary and Agricultural College, Copenhagen, Denmark]

The medial neurosecretory cells (MNC) of the adult blow-fly brain and corpus cardiacum (CC) control, via a hormonal mechanism, ovarian development and growth of corpus allatum and the accessory glands. As a working hypothesis, it was proposed that MNC and CC regulate protein metabolism of the fly [The SC¹ indicates that this paper has been cited in over 190 publications since 1955]

Ellen Thomsen
Institute of Cell Biology and Anatomy
Zoological Institutes
University of Copenhagen
DK-2100 Copenhagen Ø
Denmark

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The blow-fly, *Calliphora vicina* (*erythrocephala*), has been my experimental animal since 1940. This investigation, made at the Zoological Laboratory of the Royal Veterinary and Agricultural College (Copenhagen), resulted from an old experiment showing that an endocrine gland, the corpus allatum (CA), regulated ovarian development in the adult fly.^{1,2}

Wigglesworth had presented the first evidence for a hormonal function of neurosecretory cells (NC), showing that in *Rhodnius prolixus* the NC of the brain produce a moulting-regulatory hormone.³ Wigglesworth's finding prompted me to look for a function of the NC of the brain of the adult female blow-fly.

Since the CA is probably innervated from the NC of the brain, I originally supposed that the function of the NC was to activate the CA; if so, extirpation of the medial NC (MNC) should influence ovarian growth similar to allatectomy. However, egg chambers of flies deprived of the MNC ceased growth at a much earlier stage than did those of allatectomized flies, showing that the effect of

the MNC on ovarian growth is not solely through the CA, but that MNC must affect some other physiological process vital to egg development. Implantation of the MNC from mature females into females deprived of their MNC promoted ovarian growth and even development of ripe eggs, hence demonstrating the hormonal effect of the MNC; whereas implantation of an active CA from mature females induced only slight ovarian growth. However, implantation of corpora cardiaca (CC) from mature females could replace the MNC in promoting ovarian growth; thus the MNC and CC must be considered as a functional unit. Because the corpus cardiacum-allatum system was activated by the MNC, these cells were regarded as the overall controlling centre of the endocrine system.

Since the growth of the CA and accessory glands was also restricted in females without MNC, it seemed to me that the problem of the function of the MNC and CC might be regarded as a growth problem, implying that protein metabolism is abnormal in the absence of MNC. Since egg chambers, CA, and accessory glands were of approximately the same size as the corresponding organs of flies fed only sugar and water but no protein, I proposed the working hypothesis that the MNC and CC exert a profound influence on the protein metabolism of the fly.

When I had finished the experiments and was about to write the paper, I had a visit from an old friend, a famous insect physiologist. After discussing the experiments, he rose, made me a bow, and said, "Will you do me the favour of coming to my lecture tonight?" I was very pleased—however, a moment later, he brought me down to earth again saying, "Couldn't you possibly divide it into three papers?" "No," I replied, "it all sticks together." However, I do admit that there is too much in that paper.

I believe that my paper has been cited so frequently because it is the first demonstration of neuroendocrine function in an adult insect, because the working hypothesis, that the effect of the MNC and of the CC may be on protein metabolism, has stimulated research in this field, and also owing to the comparative aspect of the paper.

For a recent review, see reference 4.

1. Thomsen E. Relation between corpus allatum and ovaries in adult flies (*Muscidae*). *Nature* 145 28-9, 1940.
2. -----, An experimental and anatomical study of the corpus allatum in the blow-fly, *Calliphora erythrocephala* Meig. *Vidensk Medd. Natur Foren. Kbh* 106 320-405, 1942.
3. Wigglesworth V B. The determination of characters at metamorphosis in *Rhodnius prolixus* (*Hemiptera*). *J. Exp Biol* 17:201-22, 1940. (Cited 115 times since 1955.)
4. Gbardie A. Neurosecretion and reproduction. (Downer R G H & Laufer H, eds.) *Invertebrate endocrinology* New York: Liss, 1983. Vol. 1 p. 305-17.